

PHILIPS



Multimeter **PM2412A**

9447 024 12111

Service Manual

9499 475 00811

770707

MP MASTER



MA24584





PHILIPS

SERVICE

Cryogenic Equipment / Electro Analytical Equipment / Electronic Weighing / Electron Optics / Industrial Data Processing systems / Numerical Control / Radiation Measuring Equipment / Test and Measuring Equipment / Welding Equipment / X-Ray Analysis

equipment
for science
and industry

781109

PM 2412/01/02/.. and PM 2412A/01/..

SME 78

Already issued : SME 53 and SME 62

- Re : 1. PM 2412/01/02/..
1.1. Corrections of the parts list
1.2. Corrections of the circuit diagram

2. PM 2412A/01/..
2.1. Corrections of the parts list
2.2. Corrections of the circuit diagram

As documentation for the PM 2412/01/02/.. should be used:
Service manual 9499 475 00111 and this information sheet.
Service notes SME 53 and SME 62 are included in the service manual

As documentation for the PM 2412A/01/.. should be used:
Service manual 9499 475 00811 and this information sheet.

1. PM 2412/01/02/..

1.1. Corrections of the parts list, chapter 7

Of the following items the codenumbers are stated incorrect.
They must be changed into:

Item	Ordering number	Description	Refer to
C4	4822 121 40036	0.1 μ F $\pm$ 10% 250 V	B. Electrical
C5	4822 121 40036	0.1 μ F $\pm$ 10% 250 V	B. Electrical
Transaprant meter cover	5322 447 74004	—	C. General
Fixing plate	5322 466 85244	—	A. Mechanical

1.2. Corrections of the circuit diagram

In the circuit diagram the mother contact of switch SK1B (3 V/1000 V) must be connected to the line which connects SK2A/~ to the mother contact of SK1B (100 mA/1A).

9499 478 09011

PRINTED IN THE NETHERLANDS

2. PM 2412A/01/..

2.1. Corrections of the parts list, chapter 7

2.1.1. Mechanical parts list

In the mechanical parts list the item- and figure numbers are stated incorrect.
The mechanical parts list must be changed according the table below.

7.1. Mechanical

Description		Item	Fig.	Qty	Ordering number
Potentiometer knob (O)		7	6	1	5322 141 34208
Lens for reset lamp	LA1	-	-	1	5322 381 14142
Reset switch	SK3	9	6	1	5322 276 14312
Knob for reset switch	SK3	9	6	1	5322 414 25967
Slide switch $\sim/\Omega/ \equiv$	SK2	2	6	1	5322 277 24022
Knob for $\sim/\Omega/ \equiv$ switch	SK2	7	6	1	5322 414 26315
Slider assy	SK1	1	7	2	5322 290 34102
Spacer ring	SK1	4	7	2	5322 532 64241
Ring	SK1	2	7	2	5322 532 54235
Shaft	SK1	6	7	1	5322 532 64136
Knob	SK1	23	7	1	5322 414 44037
Spring	SK1	18	6	1	5322 466 94304
Ball	SK1	19	6	2	4822 520 40013
Housing		6	5	1	5322 447 94447
Frame		3	5	1	5322 447 94446
Textplate		8	5	1	5322 456 14063
Fixing bracket T1		19	7	1	5322 405 94154
Battery contact (1.5 V)		20	6	2	5322 492 64382
Battery contact (9 V)		-	-	2	4822 290 80013
Input-socket block assy		4	6	1	5322 267 44083
Carrying handle		5	5	1	5322 466 94305
Carrying handle fixing		5	5	2	5322 466 94306
Foot		-	-	4	5322 462 44143

2.1.2. Electrical parts list

Resistors

Item	Ordering number	Description
R6	5322 116 54828	2,8 M Ω VR37 1%
R9	5322 116 54547	953 Ω MR25 1%
R16	5322 116 54323	800k MR25 1%

Miscellaneous

The following items are changed or added

Item	Fig.	Ordering number	Description
F2	8	5322 253 14005	Fuse 6,3A incl. bobbin
F1	8	5322 253 14004	Fuse 1A incl. bobbin
		5322 447 74006	Transparant meter cover

2.2. Corrections of the circuit diagram (see figure)

- Resistors

R1 is 900 Ω	R7 is 3,48k	R9 is 953 Ω
R2 is 8,87k Ω	R8 is 4,53k	R10 is added
		R36 is 681 Ω

R39, R40, R41, R42 and R43 are Carbon resistors, 5%, 1/8W.

- Capacitors

C1 is 47nF

C6, 3,3 μ F $\pm$ 10% 100 V is added

C7 is 20 μ F 16 V

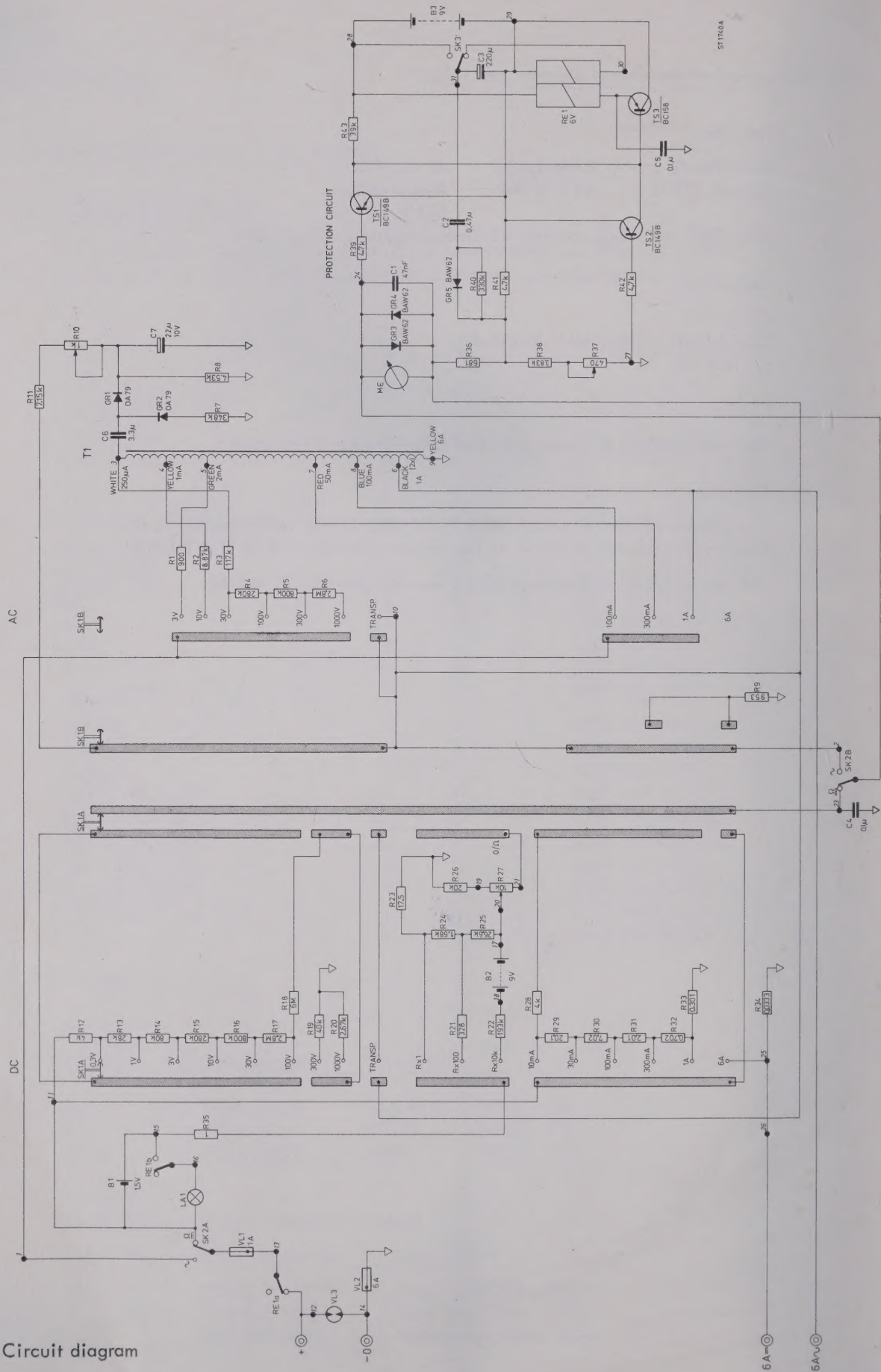
- Diodes

The item numbers of diodes GR1 and GR2 have been exchanged.

- General

The mother-contact of switch SK1B (3 V/1000 V) must be connected to the line which connects SK2A/ $\sim$ to the mother-contact of SK1B (100 mA/1A)

The item-numbers of the fuses have been changed into F1 and F2.



Circuit diagram



PHILIPS

SERVICE

Cryogenic Equipment / Electro Chemistry /
Electron Optics / Electronic Weighing /
Industrial Data Systems / Numerical Control /
Philips Pollution Measuring / Radiation Measuring Equipment /
Test and Measuring Equipment / Welding Equipment /
X-Ray Analytical Equipment

equipment for science and industry

801007

PM2412/01/.. and PM2412A/01/..

SME88

Already issued: SME53, SME62 and SME78

Re : 1. Function switch $\sim/\Omega/\text{---}$

2. Corrections of the parts list of the PM2412

As documentation for the PM2412/01/.. should be used:

Service manual 9499 475 00111, Service note SME78 and this information sheet.

Service notes SME53 and SME62 are included in the Service manual.

As documentation for the PM2412A/01/.. should be used:

Service manual 9499 475 00811, Service note SME78 and this information sheet.

1. Function switch $\sim/\Omega/\text{---}$ (SK2)

The function switch, orderingnumber 5322 277 24022, is no longer available. It is replaced by a new one. It is also necessary to replace the switch knob, ordering number 5322 414 44037.

Former situation

PM2412/01 up to serial number DY6000

Knob 5322 414 34121

Switch 5322 277 24022

PM2412/01 from serial number DY6000 onwards
PM2412A/01/..

Knob 5322 414 44037

Switch 5322 277 24022



Present situation

PM2412/01 up to serial number DY6000
stays the same, until the present
stock is exhausted

Knob 5322 414 34121

Switch 5322 277 24022

PM2412/01 from serial number DY6000 onwards
PM2412A/01/..

Knob (new) 5322 414 64131

Switch (new) 5322 277 24016



Mounting procedure for the new knob and switch

The new switch is a smaller one than the former type. The mounting holes have the correct dimensions, however they do not have an M2 thread. Therefore two nuts M2 should be used.

The new knob can be attached to the switch in the same way as in the former construction.

9499 478 11211

PRINTED IN THE NETHERLANDS

2. Corrections of the parts list of the PM2412

The ordering numbers 5322 253 14004 (VL1, Fuse 1A) and 5322 253 14005 (VL2, Fuse 6A) also include the bobbin,

The ordering number 5322 532 64135 (Fuse bobbin, item 15 Fig. 4) is no longer available.



PHILIPS

Service Information

Advanced Automation Systems
Audio-communications
Broadcast Equipment
Electronic Security & Recording Systems
Industrial Automation
Scientific & Analytical Equipment
Test and Measurement

**Industrial &
Electro-acoustic
Systems
Division**

860320

18 FAMILY

SME 123

Re: Replacement parts

Add the following sentence to the parts list:

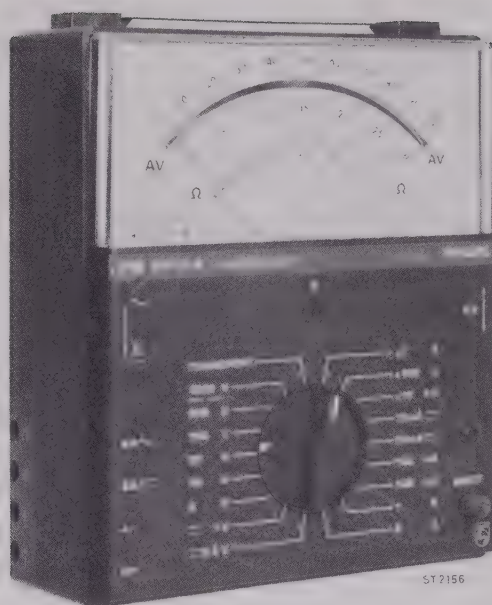


When Servicing, Use Only Specified Replacement Parts.

4822 872 38305

PRINTED IN THE NETHERLANDS

PHILIPS



Service Manual

Multimeter **PM2412A**

9447 024 12111



CONTENTS

	page
1. Introduction	3
2. Technical data	3
3. Accessories	5
4. Circuit description	7
5. Access	8
6. Checking and Adjusting	11
7. List of Parts	12

list of figures

1. HT probe PM 9246	6
2. Current transformer PM 9245	6
3. Shunt PM 9244	6
4. Everready case PM 9273	6
5. Exploded view I	9
6. Exploded view II	9
7. Exploded view III	10
8. Inside view with item numbers (right)	14
9. Inside view with item numbers (left)	15
10. Front view with item numbers	15
11. Printed circuit board "Ua" (DM600 - DM1600)	16
12. Printed circuit board "Ub" (DM600 - DM1600)	16
13. Printed circuit board "Ua" from DM1600 onwards	17
14. Printed circuit board "Ub" from DM1600 onwards	17
15. Circuit diagram	20

1. INTRODUCTION

The PM 2412 A is an universal measuring instrument suitable for measuring:

- DC voltages from 0 1000 V
- AC voltages from 0 600 V
- DC currents from 0 6 A
- AC currents from 0 6 A
- Resistances from 0 10 M Ω

For data concerning operation refer to "Directions for Use"

2. TECHNICAL DATA

2.1 Meter system

Meter sensitivity: 25 μ A f.s.d.

Taut band suspension

Scale with mirror

Needle deflection: 90°

Responsetime: < 2 sec. for deflection 0 - 75 % $\pm$ 1%
with instaneous current applied.

2.2 D.C. Voltage

Range: 0,3 V; 1 V; 3 V; 10 V; 30 V; 100 V; 300 V; 1000 V.

Input resistance/current.

0,3 V - 100 V range : 40.000 ohm/V, 25 μ A

300 V range : 33.300 ohm/V, 30 μ A

1000 V range : 10.000 ohm/V, 100 μ A

Accuracy $\pm$ 2% f.s.d.

2.3 A.C. Voltage

Range: 3 V; 10 V; 30 V; 100 V; 300 V; 1000 V.

(max. input voltage in the 1000 V range is 600 Vrms)

Input resistance/current.

3 V range : 500 ohm/V, 2 mA

10 V range : 1.000 ohm/V, 1 mA

30 V - 1000 V range : 4.000 ohm/V, 250 μ A

Reading: calibrated in r.m.s. value for pure sine wave.

Accuracy 40 Hz - 1kHz: $\pm$ 3%

1 kHz - 5kHz: $\pm$ 5%

2.4 Resistance

Range	Centre reading	Current
Rx1 Ω	20 ohm	75 mA
Rx100 Ω	2k ohm	750 μ A
Rx10k Ω	200k ohm	52.5 μ A
Accuracy 5% at centre reading		

2.5 D.C. Current

Range: 10 mA, 30 mA, 100 mA, 300 mA, 1 A, 6 A.

Voltage drop: 300 mV

Accuracy $\pm 3\%$ of f.s.d.

6 A measurement: via separate terminal

2.6 A.C. Current

Range: 100 mA, 300 mA, 1 A, 6 A.

Voltage drop: less than 1 V

Accuracy $\pm 6\%$ of f.s.d.

6 A measurements: via separate terminal

2.7 Protection circuit

DC 6 A and AC 6 A: fuse

All other ranges are protected by fuse, relay and high voltage protector.

2.8 Batteries

1,5 V 1x Recommended type Philips R 20 TR

9 V 2x Recommended type Philips 6F - 22 TR

2.9 Mechanical data

Height 185mm

Width 150mm

Depth 70mm

3. ACCESSORIES

3.1 Supplied with the instrument

- set measuring leads red/black
- set testpins red/black
- operation manual

3.2 Optional

3.2.1 EHT probe PM 9246 (fig. 1, page 6)

The HT probe PM 9246 is suitable for measuring direct voltages up to 30 kV.

The PM 9246 may be used for measuring instruments with an input impedance of 100 M Ω , 10M Ω or 1.2 M Ω (selectable).

Maximum voltage	30 kV
Attenuation	1000 x
Input impedance	600 M Ω $\pm$ 5%
Accuracy	$\pm$ 5% for instrument input impedance of 1,2 M Ω

NOTE: Pay attention to safe earth connections.

3.2.2 Current transformer PM 9245 (fig. 2, page 6)

With this transformer it is possible to measure alternating currents over 10 A up to 100 A.

Transfer factor	1000 x (100 A = 100 mA)
Transfer error	$\pm$ 3%
Frequency	45 Hz ... 1 kHz
Max. permissible secondary voltage loss	< 200 mV
Max. voltage with respect to earth	400 V a.c.
Max. air-gap	0.05 mm

Before measuring connect the current transformer to the instrument.
Prevent polution of the core-parts.

3.2.3 Shunt PM 9244 (fig. 3, page 6)

With this shunt it is possible to measure d.c. and a.c. (max. 1kHz) currents up to 31.6 A.

Current range	10 A and 31.6 A
Output voltage	100 mV and 31.6 mV
Accuracy	100 mV: $\pm$ 1%
	31.6 mV: $\pm$ 2%
Dissipation	max. 3.16 W
Dimensions	Height : 55 mm
	Width : 140 mm
	Depth : 65 mm

3.2.4 Everready case PM 9273 (fig. 4, page 6)

Before using the PM 2412 A in the everready case push out the blocking piece which blocks the terminal hole.



Fig.1 HT probe PM 9246

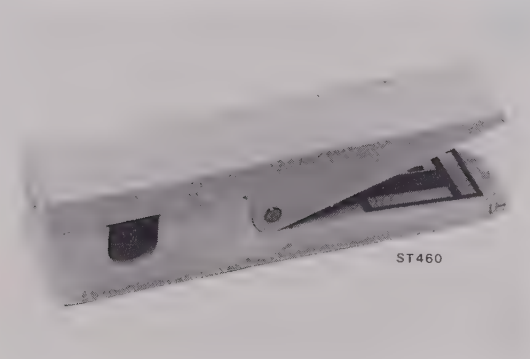


Fig.2 Current transformer PM 9245

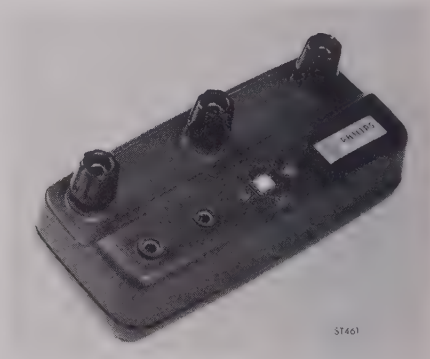


Fig.3 Shunt PM 9244



Fig.4 Everready case PM 9273

4. CIRCUIT DESCRIPTION (See fig. 15 page 20)

- 4.1 The circuit can be considered as two circuits.
- measuring circuit
 - protection circuit

4.1.1 Measuring circuit

In case of measuring DC-voltages the range switch SK 1A provides the correct series resistor in the chosen range.

When AC-voltages are measured and the instrument is switched over from DC to AC (by means of SK2), the range switch SK2B provides the correct series resistor and the correct transformer (T1) input in the chosen range.

The AC-voltage from the transformer is rectified by a diode (GR1) and then supplied to the meter system.

In case of measuring DC or AC currents the correct shunt resistance (R29, R34) and transformer coil T1, is switched into the measuring circuit.

NOTE: The 6 Amp range has separate input terminals.

4.1.2 Protection circuit

To protect the meter system from damage caused by any overload, positive or negative, the protection circuit switches off the measuring circuit by means of a bi-stable relay RE1.

After any overload the red lamp LA1 is lit. The protection circuit can be reset and checked by pressing SK3 (LA1 lightened)

The 6 A range is only protected by a fuse of 6.3 A (F2).

The other ranges are also protected by a fuse of 1A (F1).

NOTE: It is important to check the protection circuit before any measurement.

If the protection circuit is not correct the meter system is only protected by the 1A fuse (F1).

Incorrect operation of the protection circuit can be caused by an exhausted battery (B3).

5. ACCESS

5.1 Removing housing and textplate (see exploded view I fig. 5, page 9)

- remove the two screws 7
- the measuring system can now be lifted out of the housing
- bend out the four clips of the textplate a little
- lift the textplate of the measuring system

5.2 Removing the meter system (see exploded view I fig. 5, page 9)

- remove the housing (see 5.1)
- remove the battery B1
- remove the four screws 4
- unsolder the two wires of the meter system
- lift the meter system from the frame

5.3 Removing the two printed circuit boards UA and UB (see exploded view II fig 6, page 9)

- remove the housing (see 5.1)
- remove the three screws 8
- lift UA from the shaft
- remove the three printboard supports 26
- lift UB from the shaft

5.4 Removing range selector knob (exploded view II fig 6, page 9)

- remove the housing (see 5.1)
- remove the textplate (see 5.1)
- remove the spring fixingring 7
- loosen the two screws 2 and 5
- lift the selector knob out of the instrument gently

NOTE: Remember the position of the switch sliders.
Notice the two balls which fix the selector knob.

5.5 Removing the switch sliders (exploded view II fig 6, page 9)

- remove the housing (see 5.1)
- select with rotary switch transport range
- remove printed circuit board UA (see 5.2)
- remove the two screws 29 and the two nuts; holding the ringspacer and printed circuit board together
- lift the switch slider 1 from the p.c.b.

NOTE: Remember the position of the switch slider.

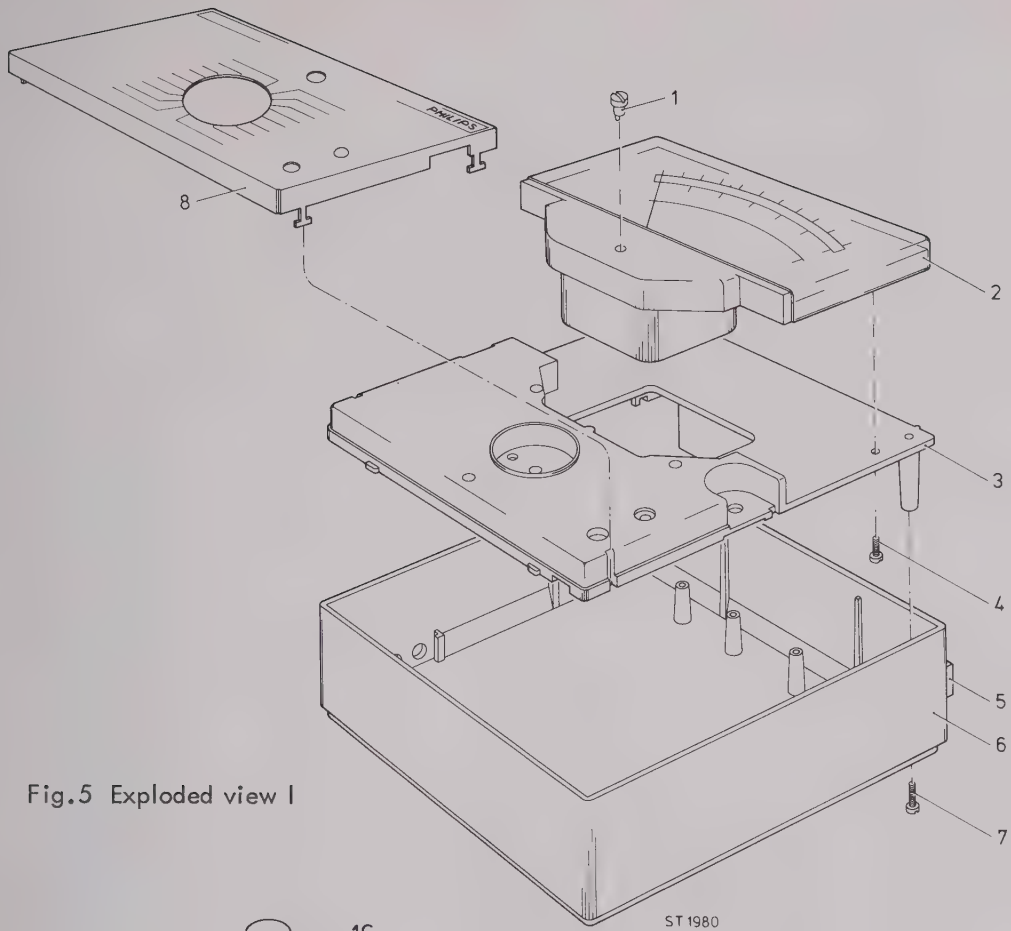


Fig.5 Exploded view I

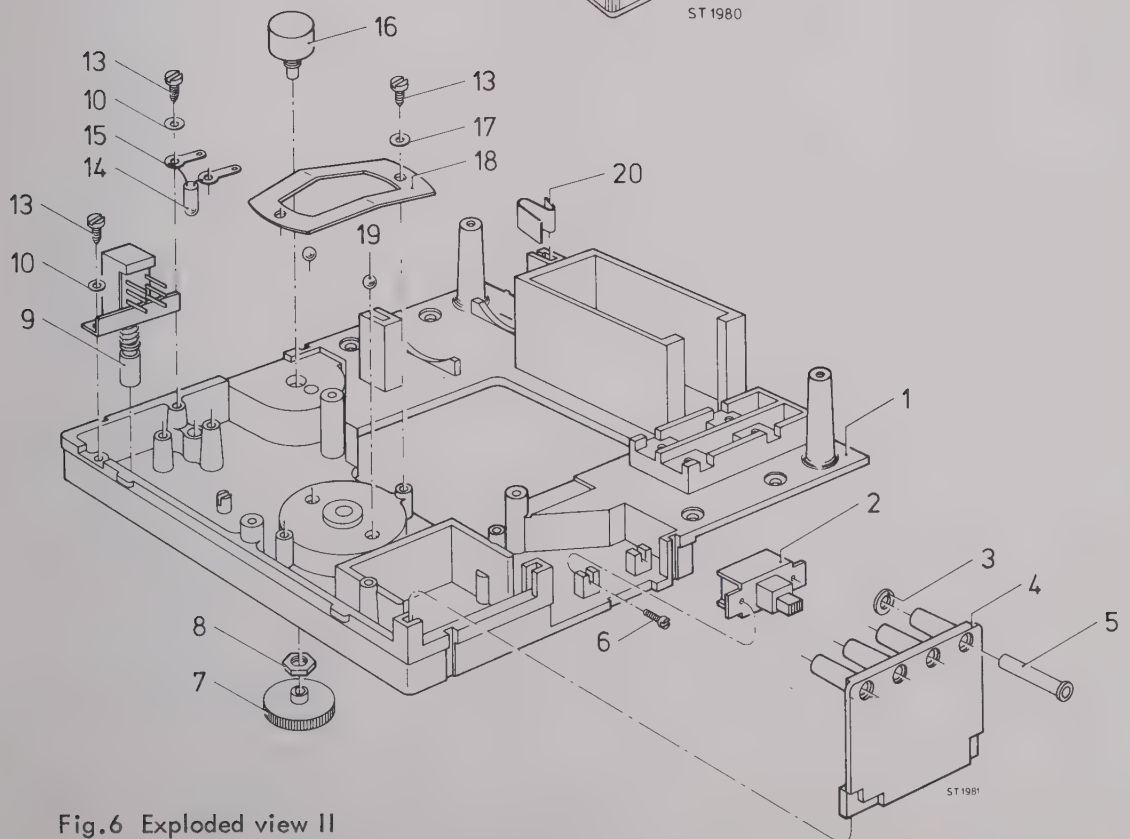


Fig.6 Exploded view II

5.6 Removing the current transformer T1 (exploded view II fig. 6, page 9)

- remove the housing (see 5.1)
- remove the printed circuit boards UA and UB (see 5.2)
- remove the two screws 17 and metal fixing 19
- unsolder the wires of the transformer and remember their position

5.7 Replacing of the fuses VL1 (1A) and VL2 (6.3A) (exploded view II fig. 6, page 9)

- remove the housing (see 5.1)
- loosen the screws 12
- take new fuse wire of the bobbins 15 and clamp them under the screws 12
- fasten the screws 12

5.8 Replacing batteries

- remove the housing (see 5.1)
- remove batteries and disconnect them
- place the new ones and be sure that the polarity is correct

5.9 To remove other parts of the measuring system. Refer to the exploded views I, II and III respectively fig. 5, 6 and 7.

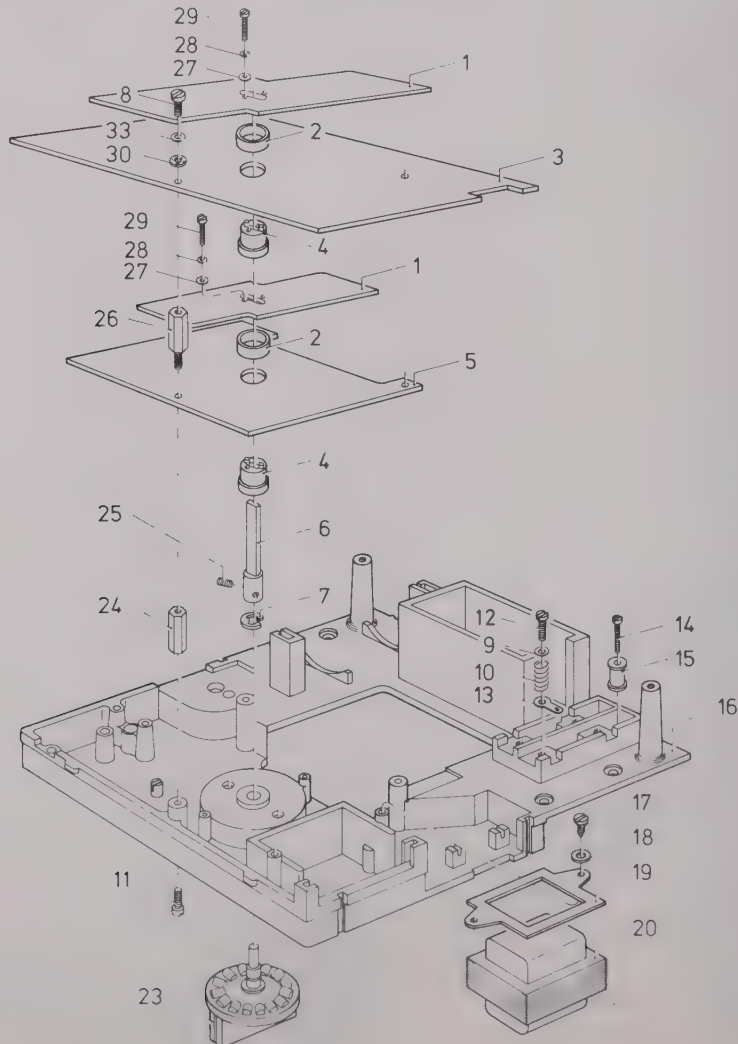


Fig.7 Exploded view III

6. CHECKING AND ADJUSTING

6.1 General

- before carrying out any adjustment it is necessary to check the mechanical zero setting and, if necessary correct it by means of the correction screw on the front panel
- check the electrical zero setting in the ohm ranges, by means of wheel "0 Ω " (R27), with the input short circuited
- after any adjustment all ranges have to be checked for accuracy

6.2 Electrical adjustment

0,3 V dc range

- connect 0,3 V dc $\pm$ 0,2% to the input terminals +, 0 -
- select 0,3 V (SK1)
- SK2 to position $\overline{\text{---}}$
- adjust meter to 30 full scale by means of R37

3V ac range

- connect 3 V ac $\pm$ 0,3% to the input terminals +, 0 -
- select 3 V range (SK1)
- SK2 to position $\sim$
- adjust meter to 30 full scale by means of R10

6A dc range

- connect 6A dc to the input terminals 6A , 0 -
- select 6A range (SK1)
- SK2 to position $\overline{\text{---}}$
- adjust meter to 100 full scale by means of R34

7. LIST OF PARTS

7.1 Mechanical

description	item	fig.	code number
frame	1	5	5322 447 94446
textplate	8	5	5322 456 14063
jewel red	-	-	5322 381 14142
pushbutton switch SK3	9	7	5322 276 14312
knob red	9	7	5322 414 25967
slide switch assy SK2	2	7	5322 277 24022
potentiometer knob	7	7	5322 414 34208
switch knob	23	6	5322 414 44037
spring	18	7	5322 466 94304
ball	19	7	4822 520 40013
bracket	19	6	5322 405 94154
contact	20	7	5322 492 64382
fuse bobbin	15	6	5322 532 64135
contact assy	16	6	5322 290 34102
spacer ring	4	6	5322 532 64241
ring	2	6	5322 532 54235
shaft	6	6	5322 532 64136
terminal board assy	4	7	5322 267 44083
housing	6	5	5322 447 94447
band	5	5	5322 466 94305
band fixing	5	5	5322 466 94306
foot	-	-	5322 462 44143
battery terminal	-	-	4822 290 80013

7.2 Electrical

resistors

item	value(Ω)	tol (%)	type	code number	description
R1	900	1	0,25W	5322 116 54932	metal film
R2	8,87 k	1	MR25	5322 116 54614	metal film
R3	117 k	1	0,25W	5322 116 54815	metal film
R4	280 k	1	MR25	5322 116 54739	metal film
R5	800 k	1	MR30	5322 116 54323	metal film
R6	2,8 k	1	VR37	5322 116 54828	metal film
R7	3,48 k	1	MR25	5322 116 54585	metal film
R8	4,53 k	1	MR25	5322 116 50631	metal film
R9	953 k	1	MR25	5322 116 54547	metal film
R10	1 k			4822 101 10005	potentiometer
R11	7,15 k	1	MR25	5322 116 54606	metal film
R12	4 k	1	0,25W	5322 116 54821	metal film
R13	28 k	1	MR25	5322 116 50667	metal film
R14	80 k	1	0,25W	5322 116 54825	metal film
R15	280 k	1	MR25	5322 116 54739	metal film
R16	800	1	MR30	5322 116 54323	metal film

R17	2,8 M	1	VR37	5322 116 54828	metal film
R18	6 M	1	VR37	4822 116 60042	metal film
R19	40 k	1	0,25W	5322 116 54822	metal film
R20	2,67 k	1	MR25	5322 116 54578	metal film
R21	328	1	0,25W	5322 116 54819	metal film
R22	193 k	1	0,25W	5322 116 54816	metal film
R23	17,5 k	1	1 W	5322 116 54831	metal film
R24	1,68 k	1	0,25W	5322 116 54824	metal film
R25	26,6 k	1	0,25W	5322 116 50373	metal film
R26	20 k	1	MR25	5322 116 54642	metal film
R28	4 k	1	0,25W	5322 116 54821	metal film
R29	20,1	1		5322 115 84014	wire wound
R30	7,02	1		5322 115 84015	wire wound
R31	2,01	1		5322 115 84016	wire wound
R32	0,702	1		5322 115 84012	wire wound
R33	0,301	1		5322 115 84013	wire wound
R35	1	1		5322 115 84017	wire wound
R36	681	1	MR25	5322 116 54534	metal film
R37	470			4822 101 10048	potentiometer
R38	3,83 k	1	MR25	5322 116 54589	metal film
R27	10 k			4822 101 20471	potentiometer

capacitors

item	value (F)	Tol (%)	voltage (V)	code number	description
C1	47 n	20	100	4822 121 40336	polyester film
C2	0,47 μ	10	100	4822 121 40438	polyester film
C3	220 μ		16	4822 124 20589	electrolitic
C4	0,1 μ	20	100	4822 121 40334	polyester film
C5	0,1 μ	20	100	4822 121 40334	polyester film
C6	3,3 μ	10	100	4822 121 40458	polyester film
C7	20 μ		16	4822 124 20476	electrolitic

semiconductors

item	type	code number	description
TS1	BC149B	5322 130 40313	
TS2	BC149B	5322 130 40313	
TS3	BC158HC	5322 130 40476	
GR1	OA 79	5322 130 30357	
GR2	OA 79	5322 130 40229	selected diode
GR3	BAW62	5322 130 30613	
GR4	BAW62	5322 130 30613	
GR5	BAW62	5322 130 30613	

miscellaneous

item	fig.	code number	description
ME1	10	5322 344 64114	meter
LA1	10	5322 134 44102	reset lamp
T1	8	5322 148 84016	current transformer
VL2	8	5322 253 14005	fuse 6,3 A
VL1	8	5322 253 14004	fuse 1A
VL3	8	5322 252 60019	spark gap
UA	8	5322 216 74051	printboard A
UB	8	5322 216 74049	printboard B
RE1	8	5322 280 74063	relay MY2KO-6V

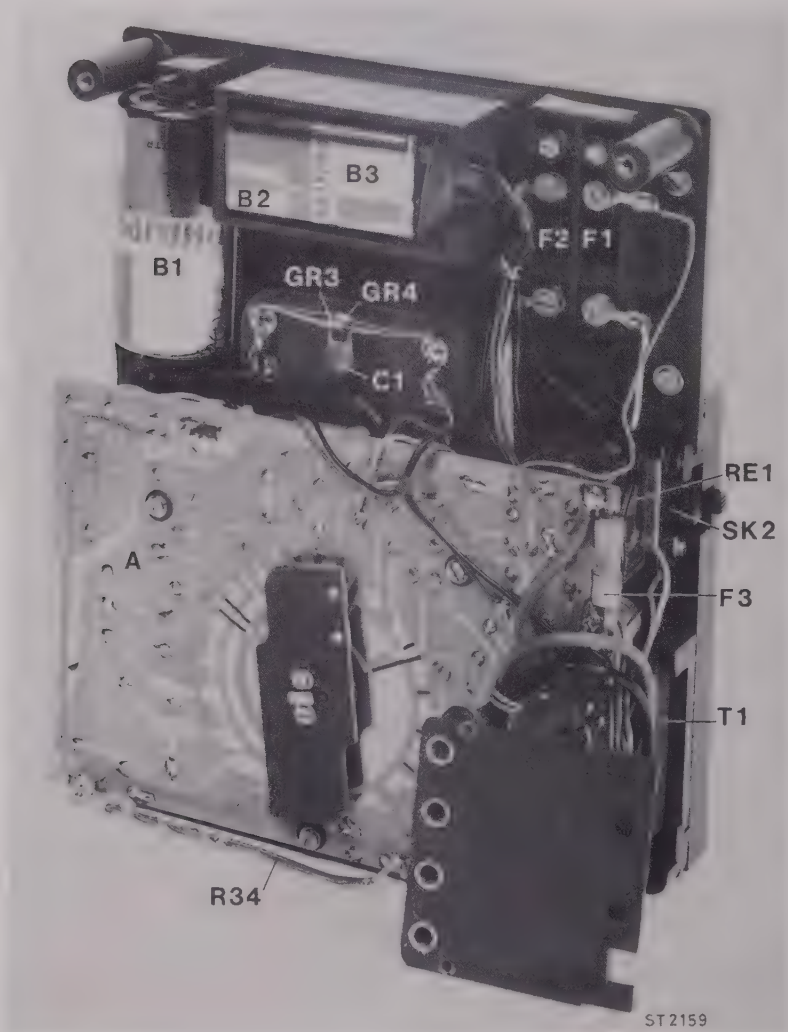


Fig.8 Inside view with item numbers (right)

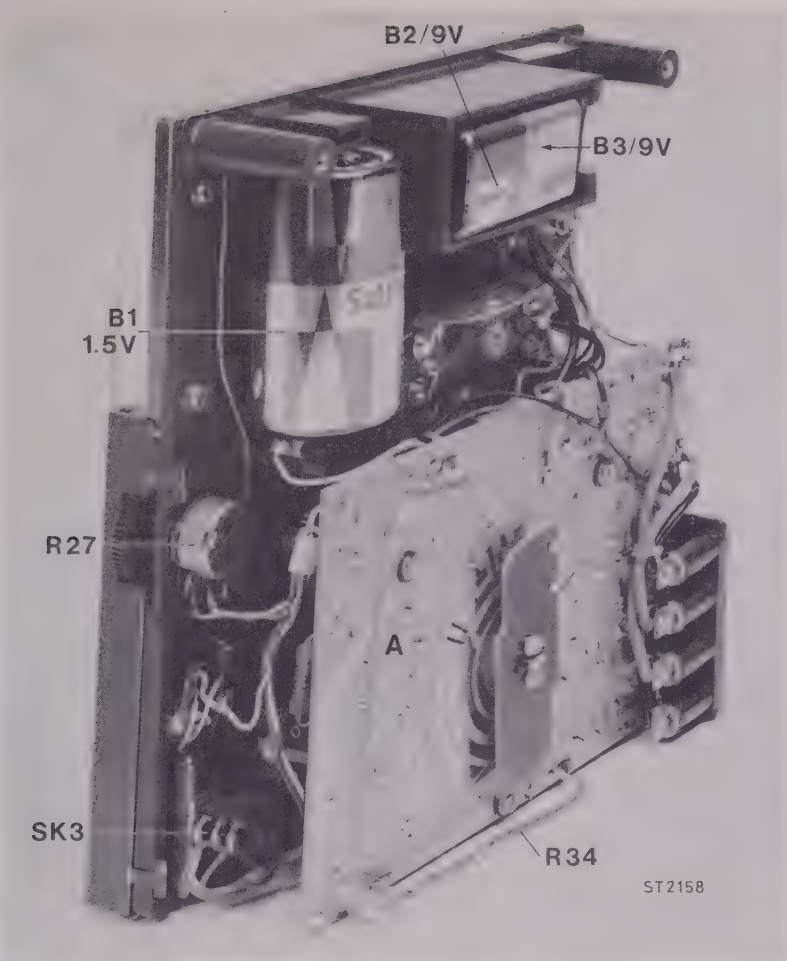


Fig. 9 Inside view with item numbers (left)

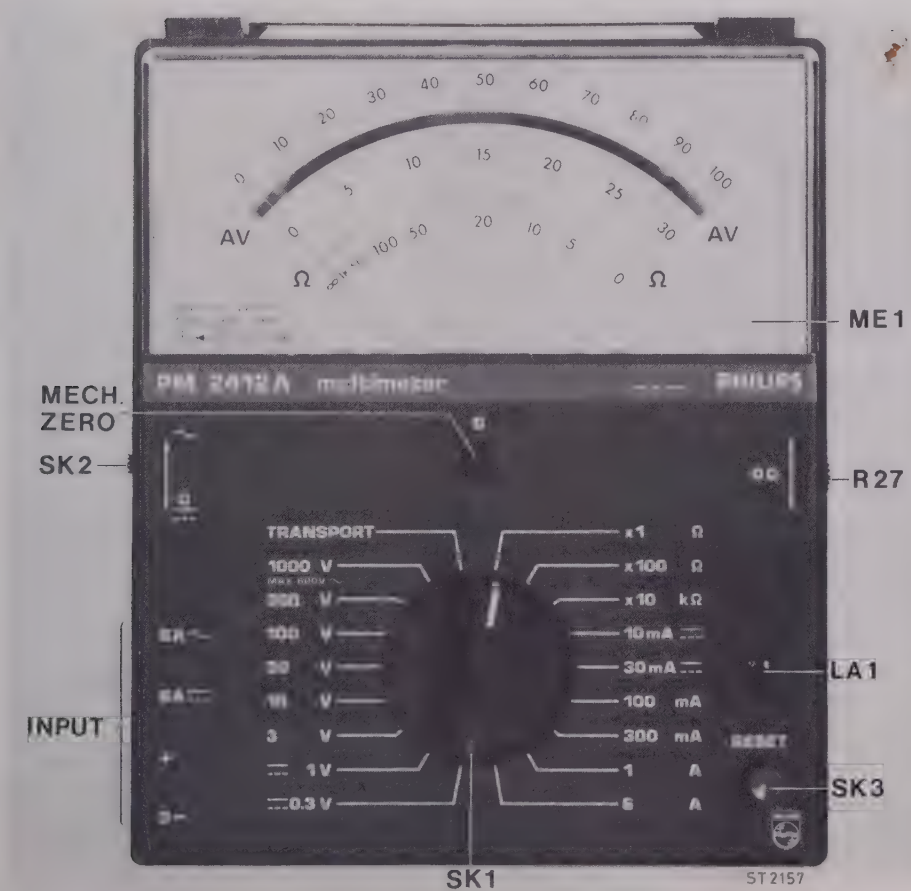


Fig. 10. Front view

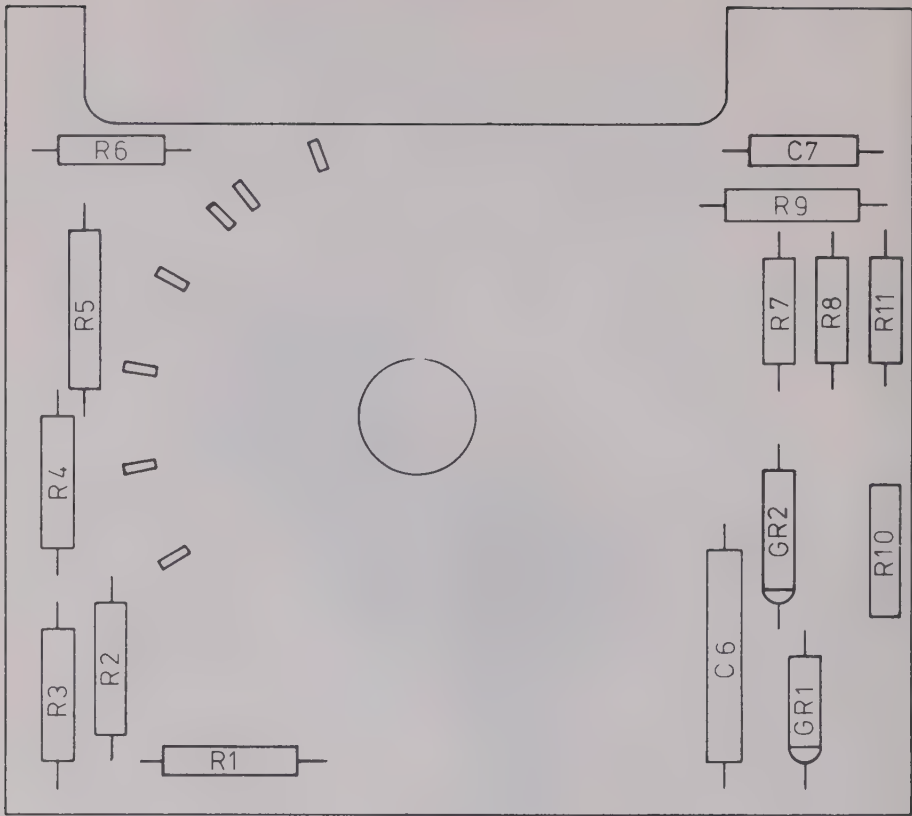


Fig.11 Printed circuit board "Ua" (DM600 - DM1600)

ST 2121

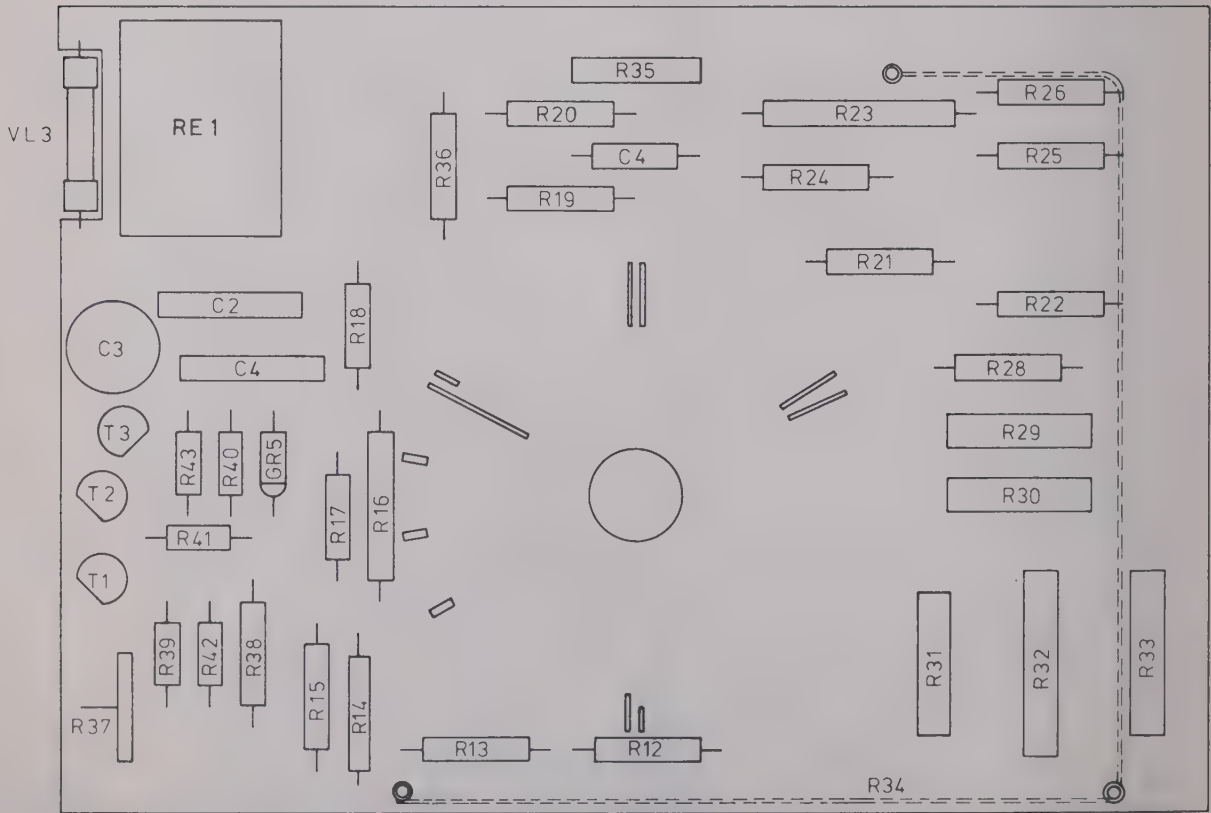


Fig.12 Printed circuit board "Ub" (DM600 - DM1600)

ST 2120

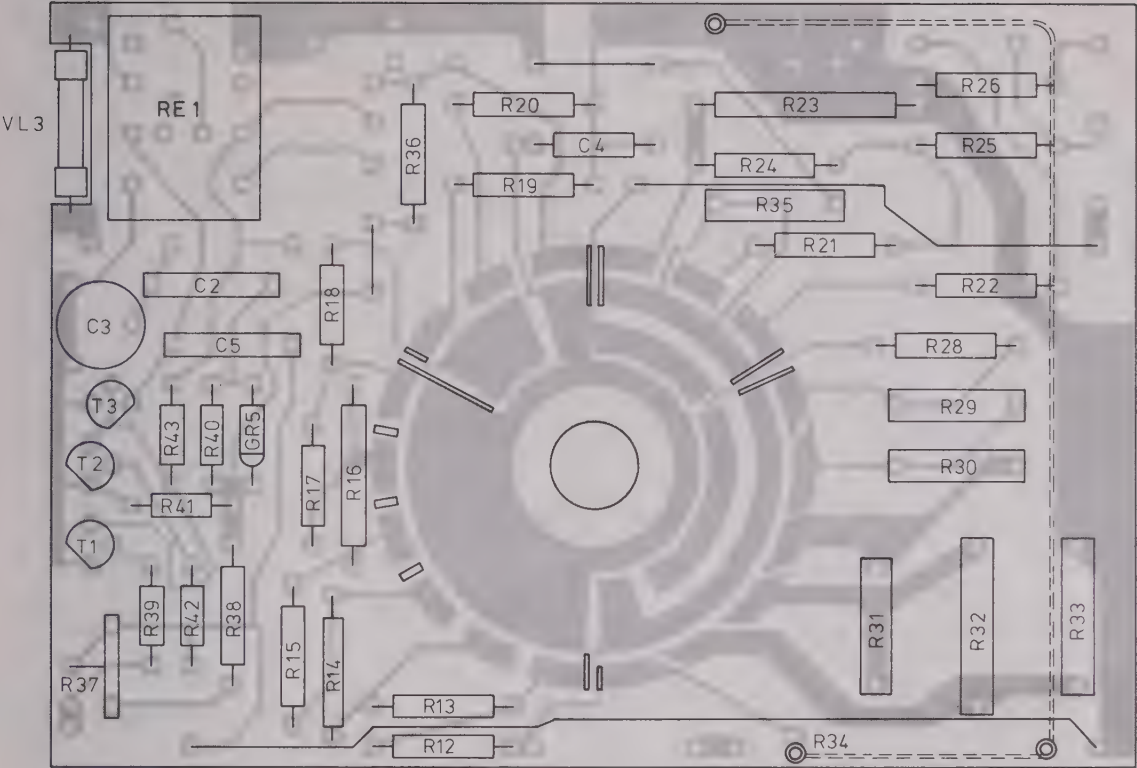


Fig.13 Printed circuit board "Ua" from DM1600 onwards

ST 2117

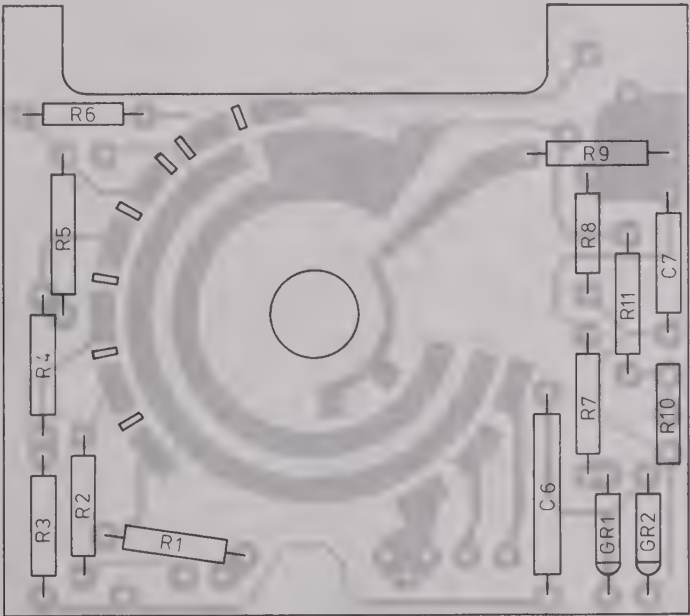


Fig.14 Printed circuit board "Ub" from DM1600 onwards

ST 2119

CODING SYSTEM OF FAILURE REPORTING FOR QUALITY
ASSESSMENT OF T & M INSTRUMENTS
(excl. potentiometric recorders)

The information contents of the coded failure description is necessary for our computerized processing of quality data.
Since the reporting of repair and maintenance routines must be complete and exact, we give you an example of a correctly filled-out PHILIPS SERVICE Job sheet.

①
Country

Day Month Year

③
Typenumber /Version

④
Factory/Serial no.

32

150475

OPM326002

DO00783

⑤

Nature of call

Location

Component/sequence no.

Category

☐ Installation

☐ Pre sale repair

☐ Preventive maintenance

☒ Corrective maintenance

☐ Other

0021

T S 0 6 0 7

R 0 0 6 3 1

9 9 0 0 0 1

5

2

4

⑦
Job completed

☒

Working time ⑧

12

Hrs

Detailed description of the information to be entered in the various boxes:
①Country: 32 = Switzerland
②Day Month Year 150475 = 15 April 1975
③Type number/Version OPM326002 = Oscilloscope PM 3260, version 02 (in later oscilloscopes this number is placed in front of the serial no)
④Factory/Serial number DO00783 = DO 783 These data are mentioned on the type plate of the instrument

⑤ Nature of call: Enter a cross in the relevant box
⑥ Coded failure description

Location

Component/sequence no.

Category

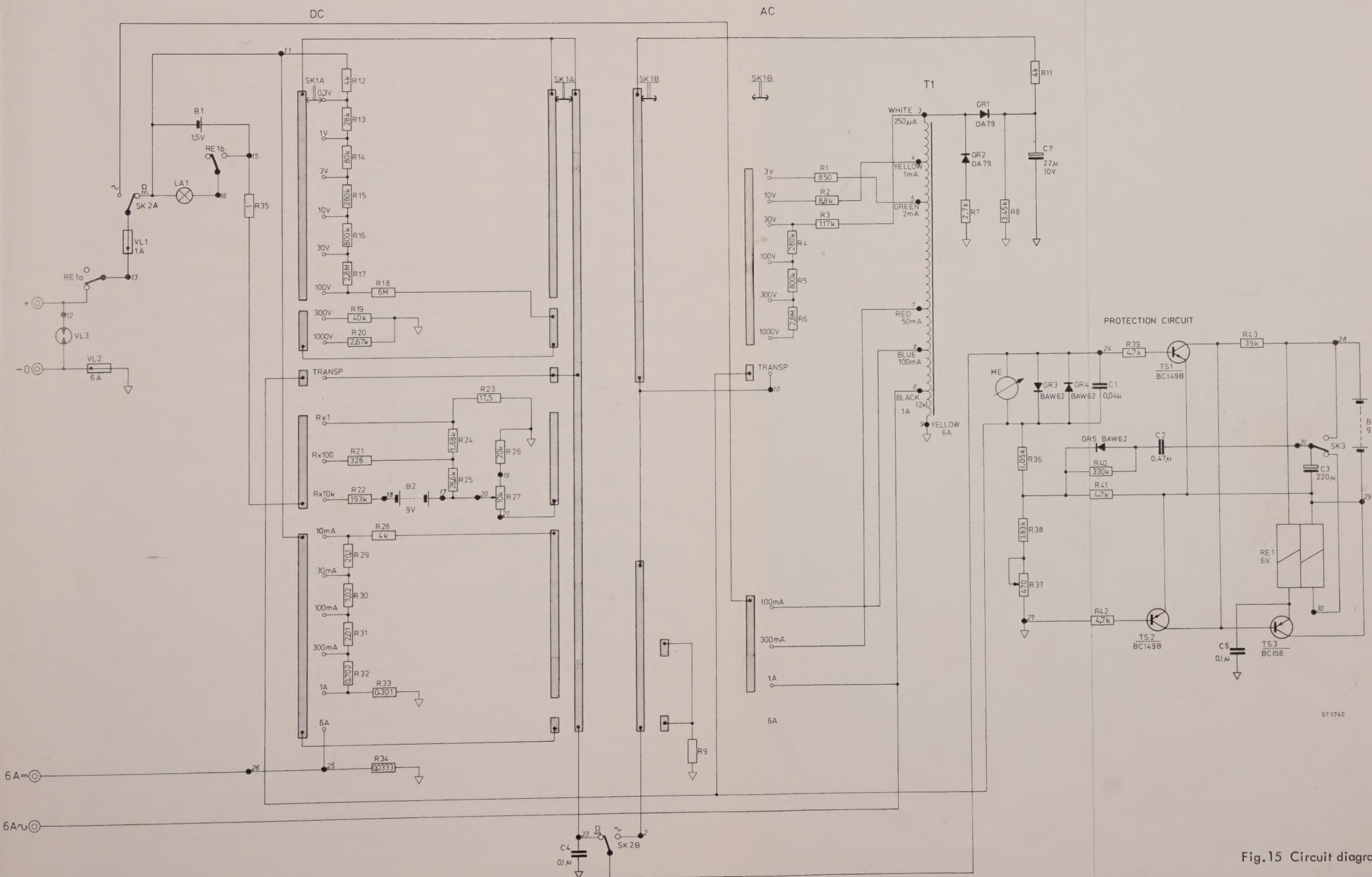
These four boxes are used to isolate the problem area. Write the code of the part in which the fault occurs, e.g. unit no or mechanical item no of this part (refer to 'PARTS LISTS' in the manual).
Example: 0001 for Unit 1
000A for Unit A
0075 for item 75
If units are not numbered, do not fill in the four boxes; see Example Job sheet.

These six boxes are intended to pinpoint the faulty component.
A. Enter the component designation as used in the circuit diagram. If the designation is alfa-numeric, the letters must be written (starting from the left) in the two left-hand boxes and the figures must be written (in such a way that the last digit occupies the right-most box) in the four right-hand boxes.
B. Parts not identified in the circuit diagram:
990000 Unknown/Not applicable
990001 Cabinet or rack (text plate, emblem, grip, rail, graticule, etc.)
990002 Knob (incl. dial knob, cap, etc.)
990003 Probe (only if attached to instrument)
990004 Leads and associated plugs
990005 Holder (valve, transistor, fuse, board, etc.)
990006 Complete unit (p.w. board, h.t. unit, etc.)
990007 Accessory (only those without type number)
990008 Documentation (manual, supplement, etc.)
990009 Foreign object
990099 Miscellaneous

0 Unknown, not applicable (fault not present, intermittent or disappeared)
1 Software error
2 Readjustment
3 Electrical repair (wiring, solder joint, etc.)
4 Mechanical repair (polishing, filing, remachining, etc.)
5 Replacement (of transistor, resistor, etc.)
6 Cleaning and/or lubrication
7 Operator error
8 Missing items (on pre-sale test)
9 Environmental requirements are not met

⑦ Job completed: Enter a cross when the job has been completed.
⑧ Working time: Enter the total number of working hours spent in connection with the job (excluding travelling, waiting time, etc.), using the last box for tenths of hours.

12 = 1,2 working hours (1 h 12 min.)



Sales and service all over the world

Alger : Sadetel; 41 Rue des Frères Mouloud
Alger; tel. 656613—656607

Argentina : Philips Argentina S.A., Cassila
Correo 3479, Buenos Aires; Tel. T.E. 70, 7741
al 7749

Australia : Philips Scientific & Industrial
Equipment, Centre Court, 25 - 27 Paul
Street, North Ryde, Sydney 2113 N.S.W.

Bangla Desh : Philips Bangla Desh Ltd.
P.O. Box 62; Ramna, Dacca, tel. 28332

België/Belgique : M.B.L.E. Philips Bedrijfs-
apparatuur, 80 Rue des Deux Gares, Bruxelles;
tel. 02/13.76.00

Bolivia : Industrias Bolivianas Philips S.A.
LA Jón postal 2964 La Paz tel. 50029

Brasil : S.A. Philips Do Brasil; Avenida Paulista
2163; P.O. Box 8681; Sao Paulo S.P.;
tel. 81—2161

Burundi : Philips S.A.R.L., Avenue de Grèce
B.P. 900, Bujumbura

Canada : Philips Test and Measuring Instru-
ments Inc.; 6 Leswyn Road, Toronto (Ontario)

Chile : Philips Chilena S.A., Casilla 2687,
Santiago de Chile; tel. 94001

Colombia : Industrias Philips de Colombia
S.A., Calle 13 no. 51—03, Apartado Aered
4282, Bogota; tel. 473640

Costa Rica : Philips de Costa Rica Ltd.,
Apartado Postal 4325, San José; tel. 210111

Danmark : Philips Elektronik Systemer A/S
Afd. Industri & Forskning; Strandlodsvej 4
2300-København S; tel. (0127) AS 2222;
telex 27045

Deutschland (Bundesrepublik): Philips
GmbH Unternehmensbereich Elektronik
für Wissenschaft und Industrie. Postfach 120,
35 Kassel-Bettenhausen, Miramstrasse 87,
tel. (0561) 501521

Ecuador : Philips Ecuador S.A., Casilla 343,
Quito; tel. 239080

Egypt : Ph. Scientific Bureau 1687, 5 Sherif
Str. Cairo — A.R. Egypt P.O. Box 1807;
tel. 78457-57739

Eire : Philips Electrical (Ireland) Ltd., New
stead, Clonskeagh, Dublin 14; tel. 976611

El Salvador : Philips de El Salvador, Apartado
Postal 865, San Salvador; tel. 217441

España : Philips Iberica S.A.E., Dpto
Aparatos de Medida, Martinez Villergas 2,
Madrid 27; tel. 404—2200

Ethiopia : Philips Ethiopia (Priv. Ltd. Co.),
P.O.B. 2565; Ras Abebe Areguay Avenue,
Addis Abeba; tel. 48300

Finland : Oy Philips Ab, Kaivokatu 8,
P.O. Box 255, 00101 Helsinki 10

France : Philips Industrie, Division de la S.A.
Philips Industrielle et Commerciale 105 Rue
de Paris, 93 002 Bobigny; tel. 830-11-11

Ghana : Philips (Ghana) Ltd., P.O.B. M 14,
Accra; tel. 66019

Great Britain : Pye Unicam Ltd, York Street,
Cambridge; tel. (0223) 58866

Guatemala : Philips de Guatemala S.A.,
Apartado Postal 238, Guatemala City;
tel. 64857

Hellas : Philips S.A. Hellénique, 54, Ave
Syngrou, Athens; tel. 230476, P.O. Box 153

Honduras : Hasbun de Honduras Apartado
Postal 83, Tegucigalpa; tel. 2-9121...5

Hong Kong : Philips Hong Kong Ltd, P.O.B.,
2108, St. George's Building, 21st floor, Hong
Kong; tel. 5—249246

India : Philips India Ltd., Shivsagar Estate,
Block "A", Dr. Annie Besant Road, P.O.B.
6598, Worli, Bombay 18; tel. 370071

Indonesia : P.T. Philips Development Cor-
poration, Jalan Proklamasi 33, P.O.B. 2287
Jakarta; tel. 51985-51986

Iran : Philips Iran Ltd., P.O.B. 1297, Teheran;
tel. 662281

Iraq : Philips Iraq W.L.L. Munir Abbas Building
4th floor; South Gate, P.O. box 5749 Baghdad;
tel. 80409

Island : Heimilistaeki SF, Saetún 8, Reykjavik;
tel. 24000

Islas Canarias : Philips Ibérica S.A.E., Triana
132, Las Palmas; Casilla 39-41, Santa Cruz de
Tenerife

Italia : Philips S.p.A., Sezione PIT; Viale
Elvezia 2, 20052 Monza; tel. (039) 361-441;
telex 35290

Kenya : Philips (Kenya) Ltd., P.O.B. 30554,
Nairobi; tel. 29981

Kuwait : Delegate Office of Philips Industries
P.O. Box 3801; Kuwait, tel. 33814

Malaysia : Philips Malaya Sdn Bhd. P.O. Box
332, Kuala Lumpur; Selangor W. Malaysia;
tel. 774411

Mexico : Philips Mexicana S.A. de C.V.,
Durango 167, Col. Roma, Apartado Postal
24—328, Mexico 7 D.F.

Nederland : Philips Nederland B.V., Bosch-
dijk, Gebouw VB, Eindhoven; tel. 793333

Ned. Antillen : N.V. Philips Antillana, Post-
bus 523, Willemstad; tel. Curaçao 36222—
35464

New Zealand : Philips Electronical Industries
(N.Z.) Ltd., Professional and Industrial Division,
Wakefield Street 181-195 P.O.B. 2097 Layll
Bay, Wellington; tel. 73—156

Nigeria : Philips (Nigeria) Ltd., 6 Ijora Cause-
way, P.O.B. 1921, Lagos; tel. 45414/7

Nippon : Nihon Philips Coporation, Shuwa
Shinagawa Building 26—33, Takanawa
3—Chome, Minato-Ku, Tokyo 108;
tel. (03) 448—5611

Norge : Norsk A.S. Philips, Postboks 5040,
Oslo; tel. 463890

Österreich : Oesterreichische Philips Industrie
GmbH, Abteilung Industrie Elektronik, Partart-
gasse 32, A-1230 Wien; tel. (0222)-831501

Pakistan : Philips Electrical Co. of Pakistan
Ltd., El-Markaz, M.A. Jinnah Road, P.O.B.
7101, Karachi; tel. 70071

Paraguay : Philips del Paraguay S.A., Casilla
de Correo 605, Asuncion; tel. 8045-5536-6666

Perù : Philips Peruana S.A., Apartado Postal
2769, Lima; tel. 326070

Philippines : Philips Industrial Development
Inc., 2246 Pasong Tamo P.O.B. 911, Makati
Rizal D-708; tel. 889453 to 889456

Portugal : Philips Portuguesa S.A.R.L., Av.
Eng. Duarte Pacheco, 6—Lisboa—1

Rwanda : Philips Rwanda S.A.R.L., B.P. 449,
Kigali

Saudi Arabia : A. Rajab and A. Silsilah
P.O. Box 203 Jeddah - Saudi Arabia;
tel. 5113—5114

Schweiz-Suisse-Svizzera : Philips A.G.,
Binzstrasse 15, Postfach 8027, Zürich;
tel. 051—442211

Singapore : Philips Singapore Private Ltd.
P.O. Box 1358; Toa Payoh Central Post
Office; Singapore 12; tel. 538811

South Africa : South African Philips (Pty)
Ltd., P.O.B. 7703, 2, Herb Street, New Doorn-
fontein, Johannesburg; tel. 24—0531

S-Korea : Philips Electronics (Korea) Ltd.,
P.O.Box 3680, Seoul; tel. 737222

Sverige : Svenska A.B. Philips, Fack, Liding
övägen 50, Stockholm 27; tel. 08/635000

Syria : Philips Moyen-Orient S.A. Rue Fardoss
79 Immeuble Kassas and Sadate B.P. 2442
Damas; tel. 18605—21650

Taiwan : Philips Taiwan Ltd., San Min
Building, P.O. Box 22978, Taipei

Tanzania : Philips (Tanzania) Ltd., Box 20104,
Dar es Salaam; tel. 29571

Thailand : Philips Thailand Ltd., 283, Silom
Road, Bangkok; tel. 36980, 36984-9

Tunisia : S.T.I.E.T., 32815 Rue Ben Ghedhahem,
Tunis; tel. 244268

Turkey : Türk Philips Ticaret A.S., Posta
Kutusu 504, Beyoglu, Gümüssüyyü Caddesi
78/80 Istanbul 1 Turkey

Uganda : Philips Uganda Ltd. p.o.Box 5300
Kampala; tel. 59039

Uruguay : Industrias Philips del Uruguay
Avda Uruguay 1287, Montevideo; tel. 915641
Casilla de Correo 294

U.S.A. : Philips Test and Measuring Instru-
ments Inc.; 400 Crossways Park Drive, Wood-
bury, N.Y. 11797; tel. (516) 921-8880

Venezuela : C.A. Philips Venezolana, Apar-
tado Postal 1167, Caracas; tel. 360511

Zaire : Philips S.Z.R.L., B.P. 1798, Kinshasa;
tel. 31887-31888-31693

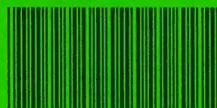
Zambia : Philips Electrical Ltd., Professional
Equipment Division, P.O.B. 553 Kitwe; tel.
2526/7/8; Lusaka P.O. Box 1878

T&M/770101

For information on change of address:
N.V. Philips' Gloeilampenfabrieken
Test and Measuring Instrument Dept.
Eindhoven - The Netherlands

For countries not listed:
N.V. Philips S&I Export Dept.
Test and measuring Instruments Dept.
Eindhoven - The Netherlands

MP MASTER



MA24584